Remarks

Claims 1-20 are pending in this application. Claims 1-3, 5-6, 8-10, 12-13, and 20 stand rejected under 35 U.S.C. 102(e) as being anticipated by Deng (U.S. Pub. No. 2002/0196491). Claims 7, 14-16, and 18-19 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Deng. Claims 4, 11, and 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Deng in view of Applicants' admitted prior art. The invention is believed to be patentable.

The invention relates to hybrid fiber coax (HFC) networks and to broadcast and narrowcast signal distribution technologies. Traditional approaches at the head end use radio frequency (RF) combining networks to combine and upconvert signals. Limitations of the RF combining networks (for example, static configuration) reduce the amount of HFC network bandwidth that can be economically used. The claimed invention involves an improved apparatus and method for providing the HFC forward path spectrum.

Claim 1 recites an apparatus for use in a hybrid fiber coax (HFC) network to provide an HFC forward path spectrum from the head end to a network fiber node. The apparatus comprises a head end modulator directly receiving a switchable digital data signal. The head end modulator internally processes the switchable digital data signal to produce a modulated optical signal that directly drives the network fiber node. The optical signal is modulated by a radio frequency signal. The radio frequency signal composes the HFC forward path spectrum and includes a plurality of channel slots. The radio frequency signal carries the switchable digital data signal in the plurality of channel slots.

Each independent claim, namely, claims 1, 8, and 15, specifically recites that the optical signal is modulated by a radio frequency signal that includes a plurality of channel slots, wherein the switchable digital data signal is carried in the plurality of channel slots. There is no teaching or suggestion of this particular feature, in the claimed combinations, in

Deng. This claimed approach to producing an HFC forward path spectrum which includes a plurality of channel slots is believed to be patentable.

Deng describes a passive optical network that uses wavelength division multiplexing. In figure 4, Deng illustrates a hybrid passive optical network employing wavelength division multiplexing. Upstream node 102 is configured as a central office exchanging communication signals with a metropolitan area network via a multiplexor and associated digital crossconnect 106. There is no teaching or suggestion of, as claimed, the optical signal being modulated by a radio frequency signal, with the radio frequency signal including a plurality of channel slots and carrying the switchable digital data signal in the plurality of channel slots.

In the final action mailed November 9, 2006, the Examiner states that Deng teaches an optical signal being modulated by a radio frequency signal, and makes reference to signals from the digital crossconnect 106 of figure 4. Further, with regard to the claimed feature of the radio frequency signal carrying the switchable digital data signal in the plurality of channel slots, the Examiner makes reference to paragraph 0031. Finally, the Examiner states that "it is noted that the signals from the digital crossconnect 106 are electrical signals, which are in the RF spectrum" and makes reference to paragraph 0026.

Applicants respectfully disagree with the Examiner's interpretation. In Deng, the optical signals λ_1-λ_4 are produced using the CWDM lasers. However, a produced optical signal in Deng is not modulated by a radio frequency signal. Digital crossconnect 106 carries baseband digital signals. The baseband digital signals are modulated onto the optical carrier. Deng does not describe an optical signal modulated by a radio frequency signal but only describes an optical signal being modulated by a baseband digital signal from the digital crossconnect 106.

The Examiner makes reference to paragraph 0031. Paragraph 0031 itself further explains that the optical signal carries baseband digital data. There is no teaching of

an optical signal modulated by a radio frequency signal. From paragraph 0031, "each ONT 114 receives its designated CWDM signal from RN 112, via a dedicated fiber link 116. By way of illustrative example, fiber link 116 may carry a single WDM channel modulated at a data rate of, say, 2.5 Gb/s for gigabit Ethernet applications (GbE)." Again, the optical signal carries a baseband digital signal, for example, gigabit Ethernet pulse amptitude modulated (PAM) signals.

Paragraph 0031 does mention that "the downstream WDM channel may be time division multiplexed using a 1:N switch to provide a plurality of lower rate data channels." However, this is only suggesting that the optical carrier may carry multiple time division multiplexed channels of digital data. There is still no teaching of an optical signal modulated by a radio frequency signal, let alone any teaching of an optical signal modulated by a radio frequency signal including a plurality of channel slots, wherein the radio frequency signal carries a switchable digital data signal in the plurality of channel slots as claimed.

At most, Deng describes an optical carrier that carries digital data (for example, gigabit Ethernet) and may utilize time division multiplexing to provide multiple lower data rate channels. In any case, there is still no teaching of an optical signal modulated by a radio frequency signal in the claimed combinations, only digital data being placed on an optical carrier.

Finally, with regard to paragraph 0026, Applicants respectfully disagree with the Examiner and contend that the signals from the digital crossconnect 106 are not radio frequency signals including channel slots carrying switchable digital data. The signals from the digital crossconnect 106 are baseband digital data signals that are modulated onto optical carriers. After all, this is the purpose of the digital crossconnect 106. That is, DXC 106 crossconnects the metropolitan area network to the upstream node 102, with signals being converted from optical to electrical and back to optical again to cross from one optical carrier to another. Deng does not relate to radio frequency domain signals. Deng only relates to signal processing in the optical domain.

Paragraph 0026 merely mentions that signals are converted from optical to electrical and back again to optical, and that Deng's teachings may be equally applied to optical networks in which no electrical conversion is needed for aggregation and routing. There is no suggestion that the signals from crossconnect 106 are radio frequency signals, let alone any suggestion that they are radio frequency signals including channel slots that carry switchable digital data as claimed.

In the final action mailed November 9, 2006, in response to Applicants' previous arguments, the Examiner makes note of the term "HFC forward path spectrum" and of the term "modulation." The meanings of these terms are really not at issue. In the Examiner's response to Applicants' previous arguments, the Examiner repeatedly refers to the signals from crossconnect 106 as RF signals. Applicants respectfully disagree, and point out that Deng is describing digital signals on an optical carrier, and does not describe the claimed arrangement of an optical signal carrying a radio frequency signal, wherein the radio frequency signal includes a plurality of channel slots, and wherein the radio frequency signal carries the switchable digital data signal in the plurality of channel slots.

Although the Examiner has repeatedly referred to the signals from crossconnect 106 as RF signals" there is no teaching or suggestion that this is the case. The Examiner states "since the signals from digital crossconnect 106 are digital and are located in the frequency domain, they are reasonably understood as RF signals carrying digital data signals." Applicants respectfully disagree. The signals from digital crossconnect 106 are digital signals; however, there is suggestion of and it does not logically follow that the signals from digital crossconnect 106 are located in the frequency domain and that they are radio frequency signals. The Examiner has not provided any specific support for the assertion that the signals from digital crossconnect 106 are located in the frequency domain, or for the conclusion that the signals are radio frequency signals meeting the claim limitations.

For the reasons given above, claims 1-20 are believed to be in condition for allowance and such action is respectfully requested.

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Respectfully submitted,

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